Glass R&D

DOE Solid State Lighting Manufacturing Workshop OLED track session

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Low Cost Materials Manufacturing

Dennis J. O'Shaughnessy
PPG Industries, Inc.

Low Cost Materials Manufacturing

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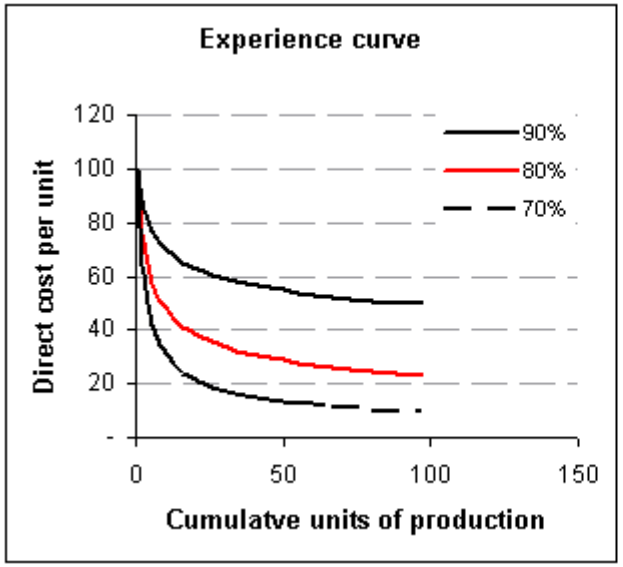
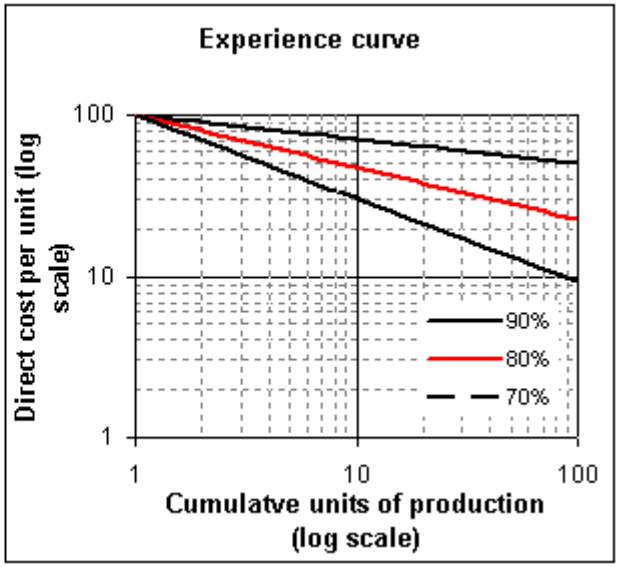
Cost Drivers:

- Scale - Fixed Cost/Invested Capital
- Process Efficiency – Variable costs.
- Experience Curve





DOE Support Priority:

- Process development: large scale/high efficiency processes

The Importance of Scale

Process	Capacity[1] (M m^2/yr)	# Lines @ 1 M m^2/yr	# Lines @ 50 M m^2/yr
.15x.15 Panel	.007	137	6860
.6x1.2 Panel[2]	.233	4.3	214
2.2x2.5 Panel[3]	1.8	0.6	28
Anode Coating	5	0.2	10
Float Glass	35	0.03	1.4

1. Assumes 1 minute TACT, 90% yield, 6000 hrs. uptime/yr.
2. 24x48 inch fluorescent troffer replacement
3. Gen. 8.5 fab.

- Large scale processes required to meet market demand.

Effect of Scale on Material Costs

Process	Capacity[1] (M m^2/yr.)	Material Cost ($/$m^2$)	Material Cost % Total
.15x.15 Panel	.007	106	5%
.6x1.2 Panel[2]	.233	74	39%
2.2x2.5 Panel[3]	1.8	51	62%

1. Assumes 1 minute TACT, 90% yield, 6000 hrs. uptime/yr.
2. 24x48 inch fluorescent troffer replacement
3. Gen. 8.5 fab.

As Scale increases:

- Materials cost will fall.
- Materials cost will drive total cost.
- Alignment through the value chain will be important.

Effect of Scale on Material Costs

Manufacturing R&D Priorities

1. Integrated OLED Panel Manufacturing:

- **Large Scale**
- **High Efficiency**

2. OLED Materials Manufacturing:

- **Organic Molecule Production**
- **Substrate, Electrodes, Light Extraction**
- **Encapsulation**

3. OLED Deposition Equipment:

- **High Throughput**
- **High Materials Utilization**